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CITIZEN SCIENCE: Bane or Boon?

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Cover Photo
A motley of lichen and moss in muskeg taken by Karoliina Munter, P. Biol. near Norman Wells in September 2013

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...notes from the E.D.

Spring is here, and many of our members are fully engaged in the field season, although not all; as our member Dapeng Gong points out in his article on microbiology in this issue of BIOS, there is more to the profession than wildlife, plant or environmental biologists!

The 2014 ASPB Conference, Endangered Regulatory Bodies, was deemed a huge success, with over 260 delegates in attendance. We were pleased to have the Alberta Minister for Environment and Sustainable Resource Development, the Hon. Robin Campbell, attend during the first morning of the conference and bring greetings from his government to our delegates.

Planning is well underway for the 2015 Conference, to be held in Canmore on March 31st and April 1st at the Radisson Hotel and Conference Centre. 2015 is the ASPB's 40th anniversary, and the planning committee has chosen the theme Witness to Change; stay tuned for updates in the next issue of BIOS!.

The Society now operates from one office, with its own staff, in Calgary. Linda Hayes Conradson is the ASPB's first employee and is the new Member Relations representative. Linda is an administrative professional with over 20 years of experience, and you will be interested to know that she was nominated last year for the White Hat Award in Best Customer Service. We are very excited to have Linda working with us! The Board has also transitioned the position of Executive Director from contract to full employment.

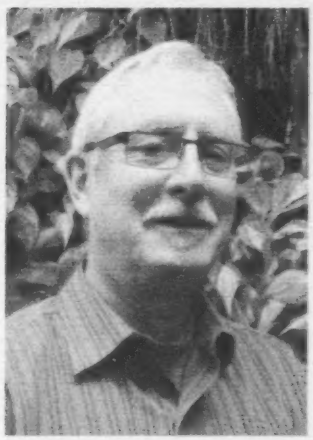
The ASPB is growing and is financially strong; there are also many new challenges and opportunities facing the Society and I look forward to continuing to play an active role in ensuring we keep moving forward to serve existing and new members. The Board has been honing its Policy Governance skills after a follow-up workshop in May, and will further refine policies over the next year. These are available on the member's only section of the website.

Looking ahead, we will work to develop a volunteer management system (we have so many excellent volunteers who have given freely of their time and expertise over the years to make the ASPB what it is today, and our volunteers deserve an efficient system through which they can continue to add value to the Society). I will also be looking into ways to offer a greater number of benefits to our members, through initiatives like we established a year ago with TD Meloche Monnex (home and auto insurance), along with assisting the Professional Development committees to deliver more of the excellent learning opportunities for which the ASPB is becoming well respected. The Calgary committee already has several brown bag lunches at the planning stage for this fall, with both Edmonton and Calgary planning a BBQ social this fall.

In April, I attended the 18th annual Professional Regulation & Discipline Conference in Toronto. The two day event examined the evolving field of professional regulation, and looked at societal trends affecting professional regulatory organizations (PROs) as well as disciplinary procedures and issues concerning registration committees and their processes. We are a growing Society but we do not operate in a vacuum; we need to be aware of what is happening with other PROs and take a proactive look at our procedures and processes to ensure we are accountable to the public, equitable to applicants, and have procedural fairness to our members in the event of a disciplinary process. I will be taking what I learned at the conference in April and testing it against our processes to ensure ASPB is being fair, equitable and transparent.

Jennifer Sipkens, ASPB Executive Director

ASPB Welcomes New President At a Time of Significant Change



The ASPB's President for 2014/15 is Chris Clement, P. Biol., R.P.Bio., R.P.F. Chris has over 40 years of environmental experience in Alberta and British Columbia, participating in the project management, scientific inventory, data analysis, report writing, technical review, application of scientific standards, and quality control for numerous large-scale projects. He is an experienced vegetation ecologist with a focus on the inventory and mapping of terrestrial ecosystems. For over 27 years he worked independently to inventory, map and describe the natural ecosystems of British Columbia. For the last five years he has worked throughout Alberta to expand his knowledge base of Alberta plant species and ecosystems. Projects completed include environmental impact assessments for vegetation and wetland resources, pre-disturbance assessments, biophysical inventory and mapping, environmental protection plans, forestry baselines, rare plant surveys, and Canadian Environmental Assessment Act (CEAA) screenings. Chris is Senior Vegetation Ecologist at Stantec. ***BIOS*** talked with Chris Clement following the ASPB's Special General Meeting on May 27th, 2014:

BIOS: *Congratulations on your new role with the ASPB! You have taken the helm at a very busy time for the Society and the profession of biology in general; looking back to the Annual General Meeting in April, a motion was passed to accept the membership category "Registered Biologist" as a non-regulated member category until such time as the Professional Biologist Regulation is amended to include "Registered Biologist" as a regulated member category. Can you enlarge a little on the significance of this motion? Is the Society currently accepting applications for Registered Biologists?*

CC: The Registered Biologist category which was adopted at the Annual Meeting in April was really structured to accommodate people who we know have been excluded from the Society. These are people who are really close to meeting the academic requirements but they might be two or three courses short. In the past those people have had to be rejected by the Registration Committee because they can't relax the requirements to accommodate them. It's a fine line, really, but a number of people have been upset by that – some have even launched appeals.

We felt there was a need to bring those people into the "fold", who were really close to meeting the requirements and who were – in effect – working and acting as biologists without the P. Biol. designation. Now these people will have the capacity to be a member as a Registered Biologist, although they won't have the ability to sign and seal or stamp documents. This will give them a foot into the door of the organization and then, if they want to go ahead and attain their academic level they can pick up those extra courses in the future and change their status.

My understanding is that – even though this was passed as a bylaw at the AGM in April – the provincial government still has to change the regulation for it to become law. So we can accept them in the interim, but will likely charge a lower membership rate until they are formally included in the regulations. At this time, we are still grappling with the details but we want to move it forward as soon as we reasonably can.

BIOS: *While the ASPB is a duly incorporated entity and is truly "owned" by its members, it appears the provincial government still plays a substantial role in determining its structure. I assume this is because it is more than a simple association: it is a society of regulated professionals?*

CC: Yes, and I recognize that some of the members have wondered why we are doing this. I think one of the things that needs to be made really clear – and maybe we have not explained this very well – the members need to understand that these changes were not something that the ASPB Board dreamed up; we were asked by the government to become more inclusive. And, truly, this whole issue of being inclusive and not wanting to be seen as elitist is really important.

There have been some questions about why we would move forward by adding so many new categories, but actually there are not that many and they all fit together and make sense. We talked earlier about establishing the Registered Biologist category, and why we are doing that, but the new technologist categories are designed to include those people who are working in technical aspects of biology, so they can have a place where they can practice in a professional society and can be regulated. Right now they feel excluded and don't fit anywhere.

And there is a very valid reason for having a professional technologist category as well as a registered technologist category: the difference between the two is the requirement for sign-off, particularly for those working in remediation and reclamation.

I think it's really important that people understand the benefits of becoming a professional. Some people may ask "what's in it for me?". There are many things, but from an occupational perspective alone, the potential employers out there are now – more than ever – looking for people with professional designations.

BIOS: *With many seemingly-simple but in fact rather complicated issues, the devil is truly in the details. As I understand it, neither Professional Technologists nor Registered Technologists can be accepted into the ASPB at least until the Society's by-laws have been changed at the next Annual General Meeting. How soon after that would you expect the Provincial Government to make changes to the Act so the ASPB can move ahead and apply the new categories of membership?*

CC: Now begins a rather lengthy process which should culminate in provincial government approval of both the experience requirement changes and the new membership categories. Working together with government legal staff, we will spend several months developing the wording for the new regulations, expecting that all the documentation will be ready for the membership to vote upon at the 2015 Annual General Meeting. Then, of course, it will be the hands of the

Registration Committee Entrusted with the Keys

By Janet Bauman, P. Biol.

Registration Committee, from left: Rob Simieritsch, Carl Warner, Janet Bauman (RC Chair), Bernd Martens, Erin Rooney, Sylvia Taylor (recently resigned), Henri de Pennart, Mark Boulton, Tara Caseley, Bette Beswick (Registrar), Shaun Toner (Board Liaison), Bob Shelast. *Photo Credit ASPB*

The ASPB Registration Committee was formed in 1991, when the Professional and Occupational Associations Registration Act (POARA) was approved. The Registration Committee reviews applications to the ASPB and decides whether to accept or refuse membership to applicants who wish to become either a Professional Biologist (P. Biol.) or Biologist-in-Training (BIT) in accordance with the Professional Biologists Regulation.

The Registration Committee currently consists of 10 members, who meet approximately every six or eight weeks, together with the Registrar. Committee members are hard-working volunteers, and as committee chair I would like especially to recognize the efforts of three of our very long-serving committee members.

Carl Warner is an original member, since 1991. Upon the Registration Committee's inception, Carl was appointed as its first Chair. Carl also served as ASPB Registrar from 2000 to 2008, and he continues to show his commitment to the ASPB through his regular attendance and hard work at the committee meetings.

Bernd Martens is also a founding member of the Registration Committee, serving for over 22 years. Bernd is semi-retired as the Principal of Montane Consulting Ltd., but continues to serve the ASPB through his exceptional attendance at our committee meetings; he hasn't missed a meeting for over 2 years! Bernd has also served on the Board of Directors of the ASPB.

Bob Shelast started with the Registration Committee in 1993. Bob has been an ASPB member since 1981, has served as a Director of the ASPB from 2002-2003 and was a Mentor for a BIT for two years. Thanks to all our dedicated members, and especially to those who have been with us so very long!

Interview continued from page 3

Legislature itself, because the new regulations package goes there for final approval.

There will be a number of opportunities for ASPB Members to review progress between now and the 2015 AGM. We will not be in a position to accept new members under R.T.Biol. and P.Tech.Biol. until the regulations have passed through the Legislature, but may be able to accept BTTs (Biology Technologists in Training) as non regulated members once the membership has voted at the AGM.

BIOS: *One of the motions which passed at the AGM in April was to "support a framework to develop legislation that regulates Chemistry, Biology, and Forestry Professionals within one Act". Can you tell us how that initiative is moving forward, and what it might mean for the ASPB if it comes to pass?*

> **"I think it's time the general public had a better understanding of what we do, and how we truly are looking after the resources of the province."**

CC: It has been a somewhat frustrating and drawn-out process to this point. We don't all share the same vision of the process and what should be incorporated within one umbrella organization, so there are some differences of opinion; we are continuing to meet with the chemists and foresters and are getting closer to agreement on how to move forward. Again, this is a provincial government-driven process to "create efficiencies", and our membership needs to know that this is far from a done deal. We certainly have to examine this from the perspective of benefits to our profession and to our members.

BIOS: *You have taken on the position of ASPB President at an exciting period in the Society's history, with looming expansion of experience requirements membership categories and the ASPB's current period of growth culminating in the 40th Anniversary of the Society in 2015. What is your vision for the Society this year?*

CC: Clearly we are at really important time in the organization's evolution. If you simply look at the numbers, that is pretty self-evident; five years ago we had 900 or so members and today there are over 1500. Last year alone we had about 300 new applications. Employers love hiring professional biologists and they usually reward them well because they know they come with a high level of credibility and a guarantee of performance, so they can count on them when they are dealing with regulatory permits and applications.

The Board will be having a visioning session this coming autumn, taking about a five-year window into the future. We are a growing operation and getting to a higher level of status, but one of our dilemmas is that the general public virtually doesn't know we exist. We need to do a better job of selling ourselves. Some of the other organizations – albeit often bigger ones – do a good job of that and I think it's time the general public had a better understanding of what we do, and how we truly are looking after the resources of the province. This is an exciting time for the ASPB and I know the current board is looking forward to maintaining the momentum achieved in the last few years.

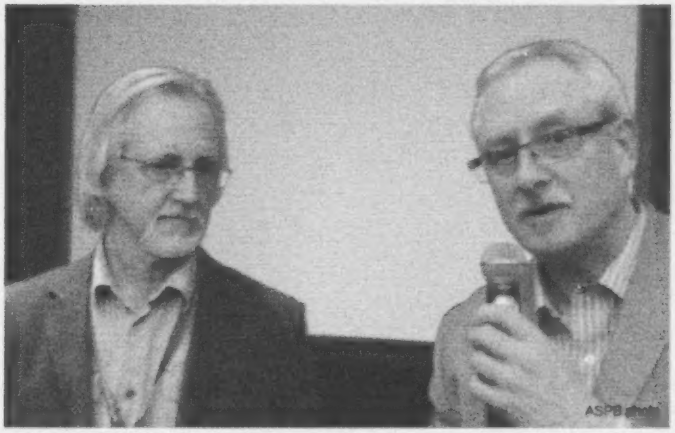
BIOS: *Thank-you!*

The Conference in Photos

The Honourable Robin Campbell, Alberta Minister for Environment and Sustainable Resource Development, brought greetings from his government to open the ASPB Annual Conference. *Photo Credit Government of Alberta*

Long-time Member Robin Leech, P. Biol. was presented with a Peggy Thompson Publication Award from President Chris Clement at the Annual Conference banquet. *Photo Credit ASPB*

Karsten Heuer, adventurer, author and film maker, inspired the 260 plus delegates enjoying the Annual Conference banquet. *Photo Credit ASPB*



ASPB President Chris Clement presents a Peggy Thompson Publication Award to Dave Dowling at the Annual Conference banquet. *Photo Credit ASPB*

Citizen Science or Natural History?

There is nothing new about the concepts of either citizen science or natural history. A very recent (April, 2014) article, *Natural History's Place in Science and Society*, published in *BioScience Vol. 64 No. 4, (http://bioscience.oxfordjournals.org)*, argues that "traditional approaches to and support for natural history in developed economies has declined significantly over the past 40 years."

As the article points out, "It is often the collective focus on natural history by hunters, fishers, wildlife watchers, and conservationists that allows consensus-based management of fish and game species." Obviously, if we fail to build and engage that focus, we will see a further slide down

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Citizen Science – Bane or Boon?

By Dee Patriquin, Ph.D., P. Biol.

Dee Patriquin is principal at Beaverhills Consulting Corp. in Camrose, AB.

The right to practice implies certain privileges based on professional expertise, and under past top-down environmental management approaches helped identify which experts could participate in management decisions. Emerging public demand for a more inclusive process regarding environmental management challenges the traditional role of the expert, but gaps in ecological literacy mean that the knowledge to manage effectively may not be shared by all.

Biologists, like many other scientists, are adapting to new roles as mentors and expert advisors for a broader audience, to ensure environmental concerns receive the informed attention required. Citizen science, the voluntary participation of the public in environmental studies, has been promoted as a means to involve the public in environmental management and foster a new awareness of the complexity of environmental problems. Nonetheless, it has sparked considerable debate within the scientific community about the value of such programs, ranging from concerns about data quality and scientific rigor to the appropriate level of involvement of a 'citizen scientist' in research activities. At the heart of the debate lie questions about the roles and responsibilities of the professional in this changing management context.

The debate seems to focus on the appropriate level of involvement of the public in project design and implementation. Amateur naturalists have long been used to collect base inventory data or assist in monitoring activity, and this level of participation seems well accepted. Amateur naturalists were first used in large-scale bird monitoring projects in Europe in the mid-1700's and for North America's Christmas Bird Count in the early 1900's. The well-known Breeding Bird Survey (BBS), established in 1996, has provided long-term data on changes in species distribution and abundances. The value of such large-scale, volunteer-based studies has become increasingly apparent in the context of climate change, providing means to monitor global habitat condition and shifts in ranges, phenology (arrival on seasonal ranges), invasive species, and composition of communities. So while public participation in science is not new, the controversy about the public's role is.

Today's volunteer is looking for a more enriched experience: they want to learn more about management issues, acquire new skills and have direct influence on solutions. New environmental education opportunities centered on conservation reflect this changing interest and are increasing popular, particularly those in appealing landscapes. A citizen scientist can help in turtle conservation in the neotropics, monitoring nests and rescuing young hatchlings, or in restoring local watersheds through an improvement project. The benefit of such programs is increased environmental awareness and – ideally – public support for environmental stewardship. A supply of eager volunteers also answers cost concerns, facilitating projects unaffordable with paid staff. But volunteers still require training, safety management and often, additional data quality controls to compensate for inexperience, which raises a philosophical question about the use of volunteers instead of more qualified professionals, and more generally, the role of the professional.

> **"Rather than establishing a line between the professional and the public, which implies exclusion, perhaps creating a conceptual space for involvement might be a more appropriate approach."**

Proponents suggest that the potential benefits of involving members of the public justify such programs. With increased separation of urban populations from the natural world comes a loss of ecological literacy – an understanding of natural process that can foster environmental stewardship and public support for necessary management action. Involvement of the public in data collection or management action could potentially develop a better understanding of environmental problems, and better buy-in to proposed solutions. Social scientists have begun to test this assumption, and preliminary work suggests results vary based on the quality of the citizen science program and the motivations of participants. Practitioners caution that citizen science projects should identify program goals in advance, to ensure that the benefits to both participants and the organization are clarified. Not all projects are appropriate for citizen involvement, due to liability concerns, skill requirements or scientific objectives. Yet in other cases, citizen scientists could help achieve other goals important to an organization, including increased environmental awareness. Rather than establishing a line between the professional and the public, which implies exclusion, perhaps creating a conceptual space for involvement might be a more appropriate approach.

This adds a subtle nuance to the debate about citizen science – how do we define our professional obligations regarding the public? Do we have a responsibility to educate about management concerns as well as advise? Many professional organizations recognize the need for more effective public communication, one aspect of this question. Making room for the public in environmental management is a much larger and difficult proposition. But as citizen science practitioners suggest, it may be a discussion that professionals should confront proactively, to identify a space for public involvement that best satisfies professional standards and public expectations. Public demand for inclusion and interest in conservation suggest an opportunity to recruit support for environmental issues – the choice to use it is ours.

the slope of decline in natural history knowledge. One ought to ask, perhaps, if increased reliance on professionals, and distractions from natural history knowledge through urbanization, has served to "dumb down" the connections between modern man and his environment.

BIOS has asked two practising scientists to speak to the topic, Dee Patriquin, PhD, P. Biol., and Prof. Maureen Reed, PhD, Professor, Department of Geography and Planning at the University of Saskatchewan. They present two perspectives of citizen science and its challenges and opportunities. As the authors of the aforementioned BioScience article point out, "...a revitalization of the practice of natural history—one that is focused on new frontiers in a rapidly changing world and that incorporates new technologies—would provide significant benefits for both science and society."

P.G.K.

Can Citizen Science Work on the Ground?

Maureen G. Reed, PhD, M.G., is Professor and Assistant Director, School of Environment and Sustainability at the University of Saskatchewan. Dr. Reed has done extensive work with Biosphere Reserves (UNESCO) in the area of citizen science and community engagement; BIOS talked to her by telephone at her office in Saskatoon.

BIOS: *Let's talk about citizen science from the perspective of the community, which may include the larger public, local residents, and even land or resource managers acting on behalf of communities. Can the application of citizen science techniques yield beneficial results for communities and their managers?*

MGR: It has that potential, but I think it has to be really well structured to be able to do that, systematically structured. For example, that might mean a commitment to sampling at particular intervals; perhaps, if there are leaders within the community who are working with students or others living there, they would be able to provide some sort of oversight to make sure the process is done the same way all the time.

I don't see why (citizen science) techniques can't inform what's happening on the ground. When scientists may not be physically present, citizen scientists in local communities can detect early warning signals and tell scientists, "hey, there's something unusual here; let's contact someone to verify that."

Researchers are now being asked to ensure that their work is relevant to local communities, and to work with communities which want them. Scientists are being encouraged to establish relationships with communities when they are engaged in fieldwork.

In the short term, results may not be as apparent as they might be over a longer period of time, and that takes a really long-term dedication (for both scientists and residents). In the long term, locally developed datasets built over time can be incredibly valuable.

BIOS: *From your experience with many different communities – particularly resource-based ones – have you observed significant desire to understand local ecosystems, at a level which would motivate the development of citizen science techniques for research and monitoring?*

MGR: Yes and no. I hate to say it, but part of the motivation – particularly in the communities where I was working – was to make observations that would support the continuation of industrial resource extraction. But people there also support nature protection. On Vancouver Island, I met a woman who spent a great deal of time in helicopters along the coast monitoring pods of whales travelling up and down the coast. She had been doing it for a number of years; it was interesting because she was actually very pro-logging (at an industrial level).

There were other women who started stream-restoration groups within their communities to get youth out of a community drug culture and into nature. They were concerned that their young people were feeling disempowered and would benefit from having physical work to do. I'm not at all sure if that's really citizen science – certainly not on the monitoring side – but they would have made observations as they were cleaning the streams, learning and understanding ecosystem processes along the way.

"Researchers need to find out what motivates people locally and find ways to integrate their research goals into the primary goals that communities have, not the other way around."

BIOS: *I have observed that often, the people who are interested in the conservation of natural ecosystems are not the people who actually live there. How do we deal with the fact that so often the people who are most interested are the ones who are least affected?*

MGR: I think we have to add it into other objectives that the people want to meet. For example, just last week I was reading a manual that deals with climate change adaptation for forest-based communities. The consultant who wrote it pointed out that climate change adaptation is slow, and may not feel immediate where people live. Awareness is low, and people may not know how to move forward. The manual's author posed one possible solution, that communities can view climate change adaptation through the lens of pre-existing planning processes like OCPs (official community plans) which are already familiar to them, so they are not facing climate change adaptation as something totally unknown and intimidating.

It's probably much the same with citizen science. As an example, for the women who got the youth out into the streams, those streams were, in fact, a secondary motivation. Researchers have to understand that their primary motivation for a project may very well be at best a secondary motivator for the participants. Researchers need to find out what motivates people locally and find ways to integrate their research goals into the primary goals that communities have, not the other way around.

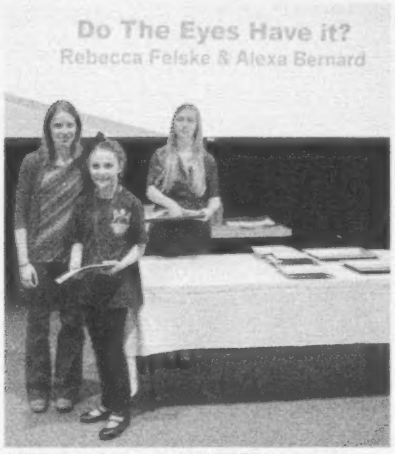
BIOS: *You have done a lot of work in Biosphere Reserves. Do they come close to fulfilling their mandate when it comes to engaging local communities in environmental management?*

MGR: No. But I am not saying that as a criticism; I think they are trying. I think they have very few human resources – the critical mass - to be able to get off the ground. A student of mine has come to the conclusion that the stakeholder model for engaging people on boards, etc. has not been terribly effective at engaging the broader community to participate in the mandate of biosphere reserves. She suggests that a move to a social enterprise model by which 'profits' of their efforts are reinvested in their communities may prove useful in this regard. She makes a compelling point.

BIOS: *Thank-you!*

Visionary Students Test for Memory Effects

Reviewed by S. K. Basu, P. Biol.



ASPB Award winners with ERSF presenter Michele Moscicki at the Edmonton Regional Science Fair. ***Photo Credit ERSF 2014***

Two bright young girls from Grade 4 at Busby School took the prize for the 2014 Professional Biologists Award at the Edmonton Regional Science Fair, held at the Northern Alberta Institute of Technology on April 12. Their enthusiasm for preparing their project (Do The Eyes Have It?), which included conducting memory tests on fellow students in a way to suggest differences between boys and girls in their relative abilities for auditory versus visual learning, along with their confident presentations, all contributed to a strong showing in the judges' review. Rebecca Felske and Alexa Bernard were presented with their awards on April 13.

ASPB Award Honourable Mention recipient with ERSF presenter Michele Moscicki at the Edmonton Regional Science Fair.
Photo Credit ERSF 2014

Taking home an Honourable Mention under the Professional Biologists Award was Mackenzie Denesik, from Grade 6 at St. Angela School. Her project, entitled "What Is Growing On My Bread?", was a carefully undertaken examination on the effects of different substrate (bread types) and environmental conditions. Although not a unique topic, Mackenzie's grasp of the scientific method, and of potential variables, revealed a strong interest in pursuing future science projects.

As part of a team of judges selecting winners for a number of biological awards, I had a great time discussing the high calibre of many of the projects with both the students and the other judges. Helping to judge the awards this year were three non-ASPB members: Lance Doucette, Shirley Chan, and Michelle Fong.

I encourage ASPB members in the Edmonton area to contact me if they wish to take part in subsequent fairs. The students are so enthusiastic and proud of their projects that it is a real delight to take part in the judging process!

Ken Chatel Receives ASPB's Distinguished Service Award

by Dave Ealey, Awards Committee Chair

Ken Chatel, P. Biol., has served the ASPB and influenced many colleagues throughout his 31 years of work and active volunteering. He is currently engaged as Manager, Law Enforcement Operations (Alberta & British Columbia, Law Enforcement Branch) at the Parks Canada Agency. He has been a member of the ASPB for 18 years.

In the early years, Ken was known as Corporal Ken Chatel. He worked with the Calgary RCMP's Commercial Crime Section where he was committed to educating the public about enforcement of endangered species legislation. The RCMP made the following statement in a successful nomination to the Alberta Emerald Award Foundation in 1999: "from an enforcement point of view, Ken Chatel has been extremely effective, surpassing all other officers in Canada in seizures (more than one million dollars in 1994 alone) and prosecutions."

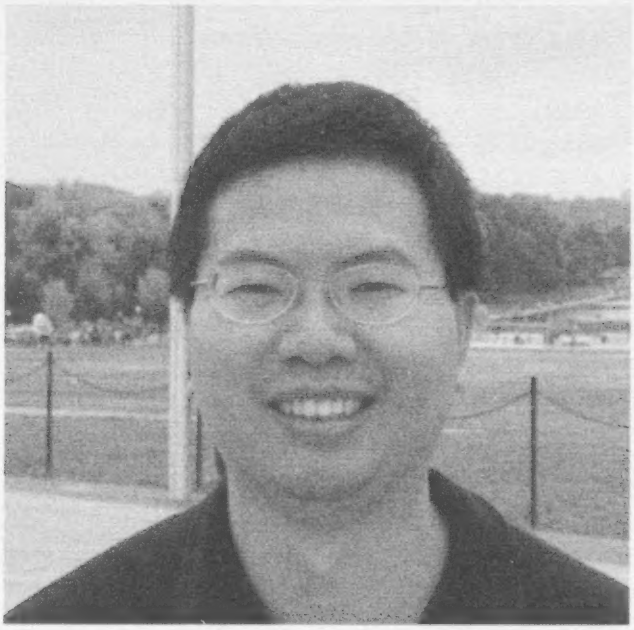
His ongoing presentations to schools, teachers' conventions and science conferences inspire awe to those listening that a biology degree could lead to such an exciting career. Ken has a positive disposition, willingly supports up-and-coming biologists with words of encouragement, and makes regular time to volunteer with ASPB's Calgary Professional Development Committee, including serving as committee chair for several years.

These are just some of his accomplishments and service to ASPB that have led to his recognition with this first ever ASPB Distinguished Service Award.

The ASPB Awards Committee includes of Dave Ealey (Chair), Lorna Allen and Linda Zimmerling. This nomination was from Stacey Schaub with contributors Jen Raffan and Carol Engstrom.

Let's Convene a Microbiology Practice Area Committee

By Dapeng Gong, P. Biol.



Microbiology is one of the ASPB's twenty Practice Areas, but so far is not represented by a steering committee. Dr. Dapeng Gong, who received his PhD in Microbiology and Immunology from the University of Miami, Florida, USA, is a new member of our Society, and is interested in getting together with other practitioners to begin the process of establishing a microbiology practice area. Dapeng did his post-doctoral research at the Harvard Medical School Immune Diseases Institute and Children's Hospital Los Angeles. His research findings on influenza and inflammation have been published in the Journal of Immunology and the Journal of Infectious Diseases. In 2013, He moved with his family to Alberta, where he is currently looking for a position.

Unlike many ASPB members who are wildlife, plant or environmental biologists, I was educated as a microbiologist / immunologist. Although I am a biologist within the general definition, my specific job is quite different from that of wildlife biologist. For example, when wildlife biologists take fascinating field trips and "pet" their favorite animals/birds/fishes, I stay in a laboratory playing with Petri dishes and "tiny bugs", which are so small that you can't see them with the naked eye. Sounds boring? Don't let the tiny bugs' "invisibility" fool you, because some of the greatest discoveries in modern medicine, such as penicillin and vaccination, came from the study of "tiny bugs" and microbiology in general.

Even though microbiology has been progressing for several centuries, it is still one of the fundamental and fascinating fields and plays a crucial role in our daily life. Our living world is surrounded by, and filled with, microorganisms. They are everywhere. Most of the time, we don't pay attention to them, because they don't bother us.

Oops, let me take that back, because "bugs" attack us all the time! In most cases, we are fine, because our immune system is fighting the war for us. But, if our immune system is impaired (for example, in HIV/AIDS patients or transplant patients), a seemingly innoxious infection could become deadly. In other cases, bugs find ways to evade our immune system or they develop drug resistance that renders our antibiotics ineffective. The recent outbreak of measles in Alberta and the World Health Organization's warning of "superbugs" (Multi-Drug Resistant bacteria) spreading globally, are somber reminders that microbiologists, as well as biomedical scientists, have challenging tasks ahead to understand those pathogenic microorganisms so therapies can be designed to fight them.

As a microbiologist who moved from USA to Alberta, I have had a tough time finding a niche in Alberta. Most biologists I met are wildlife or environmental biologists. When they talk about their projects, I have felt like they were speaking a foreign language. Likewise, I think that they felt the same when I started talking about my research on "tiny bugs". As a microbiologist, it is really tough to navigate and network in a world of wildlife/fishery/birds/environmental biologists. I think this is also a serious issue for other microbiologists, because microbiologists are a minority group within the ASPB. One way to address this issue is to form a microbiology practice area where microbiologists support each other and address their unique concerns in their practice. When I mentioned this to Jennifer Sipkens, our ASPB Executive Director, she fully supported the idea of forming a microbiology practice area which supports professional development and facilitates networking among microbiologists.

To help explore the feasibility of forming a microbiology practice area, we need all microbiologists to come forward and express their perspectives. If you want the ASPB to better serve you or to help you in a specific way, now it is the time to have your voices heard. Ideas and initiatives on how to move forward are always welcome. If you don't have any specific comments, we still want to hear from you and a simple email saying whether or not you agree with this proposal will do the trick; your RSVP response will help us gauge interest in this proposal. Comments from non-microbiologists are also welcome. To facilitate the process, I will be the coordinator for the time being. We also need volunteers to set up the microbiology practice area and to eventually form the microbiology steering committee. Please feel free to send your thoughts, comments and ideas to me at gong1898@gmail.com or to Jennifer Sipkens at jsipkens@aspb.ab.ca.

Our cover photo:

The Presidential Taxonomy Challenge

This edition's cover photo, a colourful tapestry of Alberta vegetation, got us thinking it might be fun to engage our readers in a little taxonomy contest: the first three members to correctly identify the plants visible in the photograph will receive an ASPB infuser water bottle!

The rules are simple: correctly list and name the plants represented in the photo. Each correctly identified plant is worth one point; one point will be deducted for each incorrectly listed plant. Send the results in an email to announcements@aspb.ab.ca by August 15, 2014.

This is a special "Presidential" contest. The photo is by ASPB past-president Karoliina Munter, and the contest entries will be judged by the current president, vegetation specialist Chris Clement. President-elect Shaun Toner will make the draw of correct entries to determine the three winners. (For those who are curious, we will publish Chris' list, and the names of the winners, in the Fall Edition of BIOS.)

Crossing the Line

By C.B. Sikstrom, P. Biol.

I have been crossing the line as a professional biologist for more than 35 years but late last year I thought it might be the last time. The line, in this case, is the United States border: "Are you aware that you need a work Visa in order to perform consultant duties in the United States?" was what a U.S. Department of Homeland Security officer told me on December 8, 2013.

I have a contract with an environmental consultant in the United States to provide environmental services for a client of theirs in Alaska. I signed-on to do the work and had already made two week-long trips to Anchorage during November. I was taking my third trip through the Edmonton International airport in December, and filled out the customs application form checking the visitor box for "business" and handed it to the agent. I had a return ticket and a passport that was due to expire early this year.

"What is the nature of your business in America?"

"I have business meetings in Anchorage."

"What's your profession?"

"I'm a biologist."

He motioned to a Homeland Security Agent and handed my passport and airline ticket to him.

"Follow me."

I was interrogated, finger printed, photographed and handed my sworn statement of their conclusion: "inadmissible to the United States as per INA s212(a) (7) (A) (i) (I) until he can show that he is admissible to the United States."

A Homeland Security Agent handed me a scrap of paper when I asked, "What do I need to do to be allowed in?" The scrawl on the paper read, "Trade NAFTA Visa". A female RCMP officer escorted me out of the passport secondary area and released me into the melee of people making their way through customs to go on flights that I was forbidden to.

The North American Free Trade Act (NAFTA) came into force January 1, 1994 with provisions to facilitate business travel between our two countries. After all, we share the longest undefended border in the world but some things seem to be changing.

The reality is that Canadian citizens are not required to obtain a Visa, but instead receive "TN" status when crossing the line. Canadians can apply for Trade NAFTA status – not a Visa – at the border point of entry if they have the correct documentation (see website: http://www.cbp.gov/xp/cgov/travel/id_visa/citizens/tn_status.xml)

The United States Embassy in Ottawa's website also describes these requirements: http://canada.usembassy.gov/visas/doing-business-in-america/tn-visas-professionals-under-nafta.html

On January 15th this year I returned to "cross the line" at the Calgary airport. I requested Trade NAFTA Trade Status. The first agent perused the letter of invitation from my employer, my contract with that employer, and my passport before handing them off to a Homeland Security officer. He took me to the secondary processing area and asked me to sit down. After further questioning, and the payment of a $50 fee, I crossed the line again with a stamped statement in my passport saying "TN Jan 14, 2015 Biologist ..." contracted to my employer.

As professional biologists we are listed in Appendix 1603.D.1 per section 214(e) of NAFTA as a qualified profession for entry with a Baccalaureate or Licenciatura Degree. If you have work across the line, then consider what I presented to gain entry for work in the USA:

- a Canadian passport
- a letter of invitation from my employer supporting TN Non-immigrant Worker Application
- a contract with my employer showing remuneration arrangements
- a university degree (a notarized copy may be required)
- my original Alberta Society of Professional Biologists certificate (December 1976)
- credentials – I provided an inch-thick file of original training certificates and my Curriculum Vitae

I hope this information helps your entry into the United States of America as a biologist!

VIEWPOINT
Revisiting Ocean Acidification

By Robin Leech, PhD, P. Biol.

Some of you may recall that I published in 2008 an article in **BIOS 23(2)** entitled ***Ocean Reflux or Ocean Acidification.*** In my article I quoted Kathleen McAuliffe, who wrote "Give it 50 years before the reefs disintegrate" in an article in Discover Magazine. It has not been 50 years, but the reefs are in deep trouble already.

So says an article in the May 2014 *Scientific American* titled ***The Great Coral Grief*** by Iain McCalman, in which he refers to a 2009 address to the Royal Society in London, UK, by J.E.N. Veron, the man who discovered more than 20% of the world's coral species. Veron fears the reefs are in deeper trouble than most people realize.

We have entered into a lifestyle that has unleashed bewildering changes which much of the natural world will not survive, and this has been occurring since the Industrial Revolution. Geological history tells us that four of the five previous mass extinctions of coral reefs were linked to the carbon cycle. They were caused by changes to the ocean's chemistry brought about by absorption of two primary greenhouse gases, carbon dioxide and methane, through a process of acidification of ocean water. Also, when corals are exposed to temperatures of 2-3 degrees C hotter than their evolved maximum (31 degrees C for the Great Barrier Reef), and with increased levels of sunlight, the combination is lethal.

Phytoplankton, the food of tiny krill, a key element in the food web of the southern oceans, will also be equally effected by acidification. Who knows what terrible chain of ecological consequences will follow? When we find out, earth's sixth mass destruction event will have arrived.

Veron pleads, "Use your influence. For the future of the planet, help get this story recognized. It is not a fairy tale. It is reality."

This article has been edited for length.

Dave Critchley: Biologist, Teacher, Adventurer

By Ngaio Hotte

Dave Critchley isn't one to boast about his adventurous career; it takes some coaxing to get him to share his stories.

Originally a mountain guide, he started his career working out of Hinton and Jasper, where teaching people in the outdoors enabled him to combine his academic and outdoor pursuits. He began working casually in the field of biology in the early 1990s, with organizations like the Audubon Society and local groups. In 1995, he became more formally involved in bird and vegetation studies as a technologist.

Dave's interest in biology was strongly influenced by his father, a science teacher who led the family on numerous outdoor excursions. But it was his experience working as a labourer after high school that helped him to choose his career path. "I decided I wanted to make a positive impact," Dave recalls. "Most of my best experiences have involved teaching. I taught at the University of Alberta and the University of Northern BC, and I've been teaching at the Northern Alberta Institute of Technology for 12 years now."

In teaching, Dave has clearly found his calling: he has received two Excellence Awards from NAIT, in 2005 and 2010; an International Excellence Award from The University of Austin in 2011 for his instructional skills; and an Initiatives in Sustainability award in 2009. He attributes the quality of his instruction, in part, to his willingness to continue pursuing education and training as a lifelong learner.

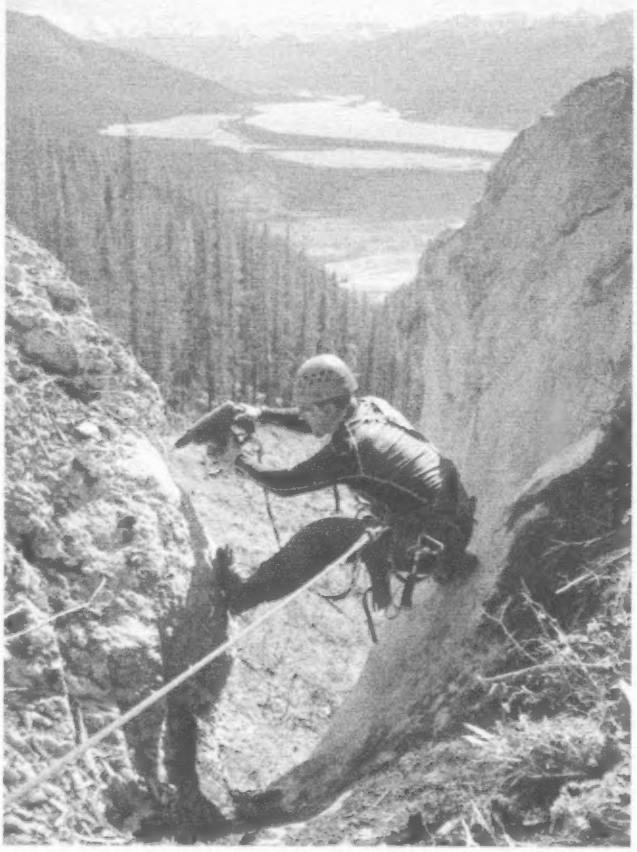
"I believe that to be relevant and useful for my students and graduates, I need to be as current as possible and the only way to do that is to keep learning and keep active," he says. "I need to get out, get involved and apply those skills."

Dave's expertise has its roots in wetland restoration ecology, but his desire to challenge himself prompts him to dabble in many fields. At NAIT, his research has shifted toward restoration ecology in an urban setting. "I look at horticulture production on rooftops, as well as herbs and grasses," he says. "We are finding twelve to thirteen times conventional tomato production on rooftops due to lack of pests and disease and elongation of the growing season."

While his work is primarily focused on vegetation, he is also involved in paleontology through his passion for caving. Since 2003, he has been a principal researcher with a colleague from Parks Canada on a project that brought in another colleague – Chris Jass from the Royal Alberta Museum – to conduct biophysical inventories of cave systems. These inventories included mapping, environmental monitoring and data logging, identification and aging of skeletal remains, photo documentation and hibernacula sampling for population abundance.

"Most of my interesting projects are caving projects in remote, extreme locations," he says. "I was sampling subterranean river systems in Wood Buffalo National Park this summer. Being in gypsum caves, the surrounding material is essentially drywall. There are pieces falling from the ceiling, freezing temperatures, flowing water. I'm going to places that no human may have ever seen before. It appeals to the explorer in me."

"One of the biggest benefits of these projects is the interconnections with different agencies," Dave says. "Greg Horne from Parks Canada and I are in contact with experts from across North America, Europe the Middle East and Australia about speleothems and rock formations."



Dave Critchley may bore rocks, but never his students!
Photo Credit Greg Horne, Parks Canada

While much of Dave's work during his twenty-year career has been based in Alberta, he has been fortunate to travel across North America and internationally. He has worked with Parks Canada in the Northwest Territories, BC, Quebec and Ontario on fire management and vegetation projects. Now with NAIT, his work in wetland management and peatland restoration has also taken him to Germany and Poland.

Over the course of his career, Dave has noticed a considerable increase in the degree of environmental regulation and permitting processes in Alberta as well as greater interest in green initiatives by businesses. "I think it is based on a desire by society to see these changes in regulation," he suggests. "In many cases, when I first started in restoration, there were no regulations. At the turn of the last century, wetlands were considered to be wastelands. Now, we are not paying people to destroy wetlands; we are paying to keep them. A lot of assessments through the National Energy Board require quantitative assessment of wetlands – this is good thing."

Dave's enthusiasm for his work is stoked by his approach of seizing experiences as they arise. He brings this enthusiasm to the Alberta Society of Professional Biologists through his contributions to the Professional Development and Technologist Membership Category Committees.

To new Biologists, he offers this advice:

"Volunteer and put experience ahead of income as much as feasible. Take as many experiences as possible and don't worry about the dollar; it will all work out in the end. If it is volunteering to sample tracks or plants, even if it is not your chosen direction, take advantage of it. Maybe your path will change."

Oil and Gas and... Owls

Corey Scobie is the Assistant Curator of Ornithology at the Royal Alberta Museum and a Ph.D. Candidate in the Department of Biological Sciences at the University of Alberta. He has worked with species at risk on the grasslands for the past 13 years, most of which has focused on mitigating industrial development. He has just started his new job at the Royal Alberta Museum and is nearly finished his thesis work, which examines the effect of anthropogenic development on burrowing owls in the grasslands of Alberta and Saskatchewan.

The influence of petroleum development on burrowing owl ecology
By C. Scobie, A. Marsh, R. Fisher, E. Bayne, and T. Wellicome

Introduction

Petroleum development has occurred at a rapid pace on the grasslands of Alberta and Saskatchewan, concurrent with the decline of the burrowing owl. The burrowing owl was listed as Endangered in Canada by COSEWIC in 1995 and to avoid potential impacts from development, federal and provincial governments developed set-back guidelines and timing restrictions near nest sites. The main premise of these guidelines is that petroleum development negatively affects individual burrowing owls and/or their nest sites and that buffering nests in both space and time reduces these effects. The goal of this study was to determine if there are effects on burrowing owl movements, prey capture, survival, reproductive success, and nest burrow re-occupancy from petroleum infrastructure or activities.

Corey Scobie at owl nest burrow picking up pellets.
Photo Credit Scott Grindal

Methods

We found and monitored over one thousand burrowing owl nesting attempts between 2003 and 2012 in Southern Alberta and Saskatchewan. At some of these nests we used GPS micro-dataloggers to track the movements of adult male owls during the day (17 owls) and night (48 owls). While tracking 18 of those owls at night, we used cameras to simultaneously record the prey that was being delivered to the nest.

Results

The average maximum distance travelled from the nest during the day was 0.25 km and owls were attracted to short perches (~1.25 m tall), but avoided tall perches (>2 m tall). They were also attracted to their nest and satellite burrows and most (95%) satellite burrows occurred within 0.18 km of the nest burrow. Owls selected for most roads during the day, but avoided roads with average traffic speeds greater than 80 km/h. Owls may be avoiding roads with high traffic speeds during the day because of higher sound levels associated with greater vehicle speeds.

During the night, owls use an average area of 623 ha, which is equivalent to a home range with a circular radius of 1.4 km. Approximately 30% of vertebrate prey captures occurred within 0.5 km of the nest, and 90% occurred within 2 km. The majority of prey items were captured by owls during the hours of 22:00 and 04:00 using high-energy foraging behaviours. Owls are furthest from the nest and moving the most two hours after sunset and two hours before sunrise. During the rest of the night, owls were 0.54 km from their nests. At night, owls selected roads and spent up to 20% of their time on them, mostly in the middle of the night. They also selected gas and oil wells, but spent more time on gas wells during twilight hours and more time on oil wells in the middle of the night. In all cover types burrowing owls searched for and captured prey in locations with shorter vegetation and more exposed ground than random locations.

We found no correlation between breeding season survival of adult owls and human footprint, but the presence of a gas well within 0.5 km of a nest was associated with higher nest survival and higher fledgling output. These positive effects were statistically significant only in one of our three study regions. Nest burrows that had an increase in the number of gas wells within 0.5 km from one year to the next were more likely to be reoccupied than nest burrows that had no increase in wells.

Discussion

Based on our results and using the precautionary principle for management of endangered species we suggest the following be considered to minimize risk to burrowing owls from human activities near nest sites. To avoid negatively affecting diurnal behaviors, the removal of short perches (~1.25 m tall), the addition of tall perches (>2 m tall), and destruction of burrows should be avoided within 0.25 km of known active nests. Within that same area, vehicle speeds greater than 80 km/h should be avoided during the day. To reduce the risk of negatively impacting owls at night during the breeding season, it should be considered that peak owl activity occurs from 21:00 to 22:00 and 03:00 to 04:00 within 1.4 km of the nest, with the highest energy foraging activities and majority of prey captures occurring during the hours of 22:00 and 04:00 within 2 km of active nests. Also, the highest risk of vehicle collisions with owls occurs within 0.54 km of known active nests from 12:00 to 02:00, because that is when owls are on roads the most. To avoid changes to prey abundance and availability during the breeding season, changes to vegetation within 2 km of burrowing owl nests should not decrease vegetation heterogeneity.

Results from our analyses suggest that petroleum development has a neutral or even positive effect on burrowing owls. If the setback distances and timing restrictions were to be relaxed because of our results, we suggest an adaptive management experiment were affected nests are closely monitored and management strategies altered depending on the response of the owls.

The full paper is available for download from the ASPB website (www.aspb.ab.ca/newsletter) under the heading "Download Technical Papers" in the right-hand column.